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Ecological observations on the genus *Samia* Hübner, 1819 (Lepidoptera, Saturniidae) of China, especially the natural hostplants

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Abstract. A few members within the genus *Samia*, have been widely collected and domesticated due to their sericultural or entomophagous value. Based on field observations in recent years, this article summarizes and analyzes relevant ecological information, especially focused on the hostplants in nature, related to all five species of this genus naturally distributed in China, and another population restricted to artificial environments. Plants in the families Rutaceae, Simaroubaceae, Euphorbiaceae, Lauraceae and Coriariaceae are considered suitable for feeding the caterpillars of most members of these wild silkworms, while Styracaceae and Theaceae require special attention in future field surveys or captive experiments. Combined with the results for *Samia*, an additional contribution of this work is to discuss the hostplant discoveries for the genera *Archaeoattacus* Watson, 1914 and *Rhodinia* Staudinger, 1892, which are also members of the tribe Attacini, to reveal potential homologies in hostplant preferences within a larger phylogenetic context beyond *Samia*.

Introduction

The genus *Samia* Hübner, 1819 comprises several well-known and economically significant sericigenous species, among which the eri and ailanthus silkworms are particularly prominent (e.g., Su 1993: 4–5). The former has been especially widely studied due to the considerable economic value it carries (e.g., Zhang 1958: 2–5), while the other species have received relatively little attention. *Samia* should be regarded as a strictly Asian genus which naturally occurs only in broadleaf forests, however, since the 19th century thanks to sericulture, captive individuals have long spread throughout the world, and now the ailanthus silkmoth is established around the metropolitan districts of various European and North American cities such as Paris, Vienna, Boston, and New York (Peigler 1993).

Phylogenetically, the genus *Samia* has been traditionally considered as a member within the tribe Attacini of the subfamily Saturniinae (e.g., Peigler 1989); another name which was widely but incorrectly circulated is *Philosamia* Grote, 1874, a junior objective synonym of *Samia* (Fletcher and Nye 1982: 145). The sister group of *Samia* is *Callosamia* Packard, 1864 + *Hyalophora* Duncan, 1841 (Collins et al. 2024), a clade restricted to the Nearctic realm (d'Abrera 1998: 104–107).

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Morphologically, these large moths in the genus *Samia* are usually maroon, brown or olivaceous in appearance. A typical homologous feature is the prominent forewing apex with a submarginal eyespot of the cell R5 [between the veins R5 and M1], which some suggest mimics the head of a snake or other vertebrate; on each wing, all species of this genus have a crescentic and esquamate "window" located on the distal area of discoidal cell [between the veins M1 and M3] (Peigler and Naumann 2003: 45). The newly hatched larvae [L_1] of *Samia* are yellowish and adorned with black dots or horizontal stripes, the bases of a pair dorsal [D] scoli of the 8th abdominal segment [A_8] are fused mesially. The primary setae on tactile dorsal [XD] and subdorsal [SD] prothorax [T_1] are always borne on separate scoli, and this trait has been noticed on some other related genera within Attacini (e.g., Liu 2024). Mature larvae of *Samia* are usually greenish but sometimes lean toward white or blue, their dorsal scoli are spine-like and elongated, the integumentary epicuticle is covered by more or less white waxy powder dorsally to laterally, and experiments suggest that this may help deter tachinid flies (Diptera: Tachinidae) from ovipositing on host epicuticle (e.g., IEBCAS 1956).

The genus *Samia* has been systemically revised by Peigler and Naumann (2003), which listed six species naturally or artificially distributed in China, but, as highlighted by their study, relevant ecological notes and hostplant records were fragmentary and severely lacking. This study is primarily based on visual observations of preimaginal material of *Samia* spp. in the wild during 2006–2025, and particular attention was paid to their natural hostplants. In addition to the authors' field surveys, we have also extensively collected eyewitness records from other Chinese colleagues. The data set contains all the five native species in China, with a short review for another that only exists in captivity. The investigation scope covers most available provinces/direct-administered municipalities. New information is intended to help facilitate habitat conservation of these wild silkworms, or the hostplant development based on captive populations.

Materials and methods

Identification

We have documented the complete life histories of all six Chinese species under laboratory conditions. This now allows us to identify living preimaginal material that was directly observed in the wild by correlating its morphological characteristics and collection site with standards established through our laboratory studies. For some dubious individuals, we further reared the larvae on the same plant collected in the wild, or kept the cocoons indoors until the emergence of the adult moth for a reliable identification. For observations provided by other witnesses, we mainly relied on: 1) the known distribution range of the presumptive taxon; 2) images of the observed individual, taken either in the field at the time of observation or later in the laboratory; and 3) specimens of the observed individual sent to us.

Experimentally, the plant to which the eggs are attached in the wild can be considered the potential natural host, as can the plant on which the larvae are found. However, in some cases, fully-grown larvae may leave the food plant to spin cocoons; hence, identification of such individuals was considered unreliable, and observations of wandering individuals were excluded from the Results section. Nevertheless, the scientific names of other samples (such as empty cocoons and egg shells) were inferred from identifiable specimens—either molecularly or morphologically—collected from the same or nearby locations.

General equipment

Figs 1, 2, 3A, C, D, G, I, P, 4, 5A, C–E, H–I were taken with a CANON 80D DSLR with lens LAOWA 100 mm *f*/2.8–22 and CANON EFS 18–135 mm *f*/3.5–22, by Yujie Wu. Figs 3B, E, F, H, J–L, N, Q, 5B, F, G were photographed with a NIKON D5500 DSLR and LAOWA 60 mm *f*/2.8–22 lens, by Zhengyang Liu. Fig. 3M was taken by Qingsong Ge, using a phone. The visual optimization and image-stitching were done with AFFINITY PHOTO 2.4.2 by Zhengyang Liu.

Terminology

Throughout the article, the morphological terms referring to the larval stage largely follow Stehr (1987), while the structures of adults principally adopt the annotation of Kristensen (2003), and the abbreviations used are the following: L_{1-5}: the 1st–5th larval instars; (AD) = observed directly, witnessed by one of the authors in the wild; (AI) = observed indirectly, the information obtained by one of the authors through acquired material; (OD) = observed directly, witnessed by another person in the wild; (OI) = observed indirectly, the information obtained by another person through purchasing material. For each of our records, the format is: "preimaginal material(s); plant(s) where the material is located; location(s) + elevation(s); date(s)".

Results

1. *Samia cynthia* (Drury, 1773)

Fig. 1A, B

Material examined. LIAONING: (AD): Seven empty cocoons; *Zanthoxylum bungeanum* (Rutaceae); the coast of Ganjingzi District, Dalian, ca. 23 m; 03 June 2017. **(AD):** A mature larva; *Zanthoxylum* sp.; Fenghuangshan, Fengcheng, Dandong, 200 m; 14 September 2019. **(OD):** About thirty mature larvae; mostly feeding on *Ailanthus altissima* (Simaroubaceae) and some on *Z. bungeanum*; urban area of Lianshan District, Huludao, Liaoning, 29 m; 22 August 2020. **BEIJING: (OD):** Mature larvae and cocoons, unknown number; *A. altissima*, *Z. bungeanum* and *Phellodendron amurense* (Rutaceae); suburban Haidian and Changping Districts; August 2019–2023. **(AD):** A cluster of L_2 larvae; *A. altissima*, ca. 3 m tall; Badaling National Forest Park, Yanqing District, 577 m; 23 June 2019. **SHANDONG: (AD):** A total of thirty mature larvae, about 1–12 individuals on each plant; cultivated *Z. bungeanum* in plantations, 3-meter-tall trees; Sibaoshan of Zichuan District and Hudieyu of Boshan District, Zibo, ca. 30–130 m; late August to early September, 2006 and 2009. **(OD):** A mature larva; *Tetradium daniellii* (Rutaceae); Fohuishan, Jinan, 290 m; 23 August 2010. **(AI):** About 500 g of empty cocoons; *Z. bungeanum* and *A. altissima*; the coast of Longkou, Penglai of Yantai, ca. 49 m; March 2024. **JIANGSU: (AI):** Twenty wild cocoons; *Camphora officinarum* (Lauraceae); Guanyun County of Lianyungang, Jiangsu, ca. 4 m; 19 December 2021.

Notes. As the type-species of the genus, polyphagous *S. cynthia* has long been known as the ailanthus silkworm/silkmoth due to one of its main hostplants in nature. Besides being another main feeder on *Z. bungeanum*, this species has also been recorded as a significant pest of *Ziziphus jujuba* (Rhamnaceae), *Paulownia elongata* (Paulowniaceae), *Punica granatum* (Lythraceae) and *Lagerstroemia indica* (Lythraceae) in the wild in Hebei (e.g., Zhang et al. 1994; Li et al. 2001; Dai 2005). *S. cynthia* is commonly reported from most provinces in northern China but remains unknown in the semiarid regions of the Loess Plateau and the Mongolian Plateau. Furthermore, although specimens have been recorded from Shanghai, Jiangxi, and Zhejiang (Peigler and Naumann 2003: 98–99), another species

Figure 1. Adults of *Samia* spp. from China, dorsal views. **A.** *S. cynthia* ♂, Heshan, Donggang District, Rizhao, Shandong, ca. 334 m, 24 March 2024; **B.** *S. cynthia* ♀, Beijing Botanical Garden, Haidian District, Beijing, ca. 316 m, March 2024; **C.** *S. wangi* ♂, Longjiang Township, Yongfu County, Guilin, Guangxi, ca. 214 m, 20 March 2024; **D.** *S. wangi* ♀, Linfengshan, Fuyang District, Hangzhou, Zhejiang, ca. 370 m, 22 April 2024; **E.** *S. kohlli* ♂, Tuanjie Township, Xishan District, Kunming, Yunnan, ca. 2200 m, September 2023; **F.** *S. kohlli* ♀, Gejiu, Honghe Hani Yi Autonomous Prefecture, Yunnan, ca. 1780 m, 26 July 2023. Scale bar: 3 cm.

is more common in these southern areas (see section 2). The habitat of *S. cynthia* ranges from plains to hills, including near the coasts, and it flies both in cities and forests. The species is probably univoltine or bivoltine in most northern Chinese habitats. Adults emerge from May to September, according to field observations by Du et al. (2010) in Liaoning and Zhengyang Liu in Beijing. In Tianjin, Wen et al. (2001) reported that it is bivoltine, and many studies note that there are 2–3 generations

naturally in Hebei (e.g., Luan 1994; Zhang et al. 1994; Zhang 1995; Zhang et al. 1996; Sun 1998; Li et al. 2001), as well as in the wild in Shandong (e.g., Nie et al. 2025). The wings usually have a dark olive-green tinge, and there are five larval instars. During $L_{1–4}$ the individuals are sometimes clustered, and the mature larvae are solitary (Fig. 3J). *S. cynthia* overwinters as pupa, with the grayish or brownish cocoons which usually have peduncles and usually hang on the hostplants, but in captivity it can occasionally be seen spun away from the hostplant. This moth was once one of the main sericulture species in ancient China (e.g., Jiang et al. 1996; Peigler 2020), and the cocoons were collected and used to make hand-spun yarns, mainly in rural Shandong (e.g., Wallace 1866; Rondot 1887: 78; Fauvel 1895: 76). However, this industry almost disappeared after Chinese Economic Reform (ca. 1978) and commercial silk is no longer found on the market.

2. *Samia wangi* Naumann & Peigler, 2001

Fig. 1C, D

Material examined. JIANGSU: (OD): Six ova, side by side and single layer, attached on the leaf underside, and five L_3 larvae clustered or alone on the leaf undersides; *Picrasma quassioides* (Simaroubaceae); Zijinshan, Nanjing, ca. 100–200 m; 29 August 2021. **HENAN: (OD):** Dozens of mature larvae; *A. altissima*; Shuixianqiao Village, Shihe District, Xinyang, ca. 150 m; 16 September 2023. **SHANGHAI: (AD):** An empty cocoon; *Magnolia denudata* (Magnoliaceae), the tree was far away from other vegetation; Pujiang Country Park, Minhang District, 6 m; 24 October 2021. **(AD):** A cocoon; *Triadica sebifera* (Euphorbiaceae); Qingxi County Park, Qingpu District, 5 m; 13 October 2021. **(AD):** Four cocoons (Fig. 3P); *C. officinarum*; Sheshan Station, Songjiang District, ca. 5 m. 06 February 2024. **ZHEJIANG: (AD):** A cluster of six L_3 larvae (Fig. 3E) and one mature larva (Fig. 3K); *Hovenia acerba* (Rhamnaceae) and *Sabia japonica* (Sabiaceae); Qinglangfeng National Nature Reserve, Lin'an District, Hangzhou, 400–420 m; 20–22 June 2021. **(OD):** A mature larva; *Euscaphis japonica* (Staphyleaceae); Tianmushan National Nature Reserve, Lin'an District, Hangzhou, ca. 900 m; 09 October 2022. **(AD):** Seven ova side by side in a single layer, attached on the underside of a leaf, and also four solitary L_3 larvae; *Litsea* sp. (Lauraceae); Siwuling, Xiaoshan District, Hangzhou, 304–390 m; 12–14 August 2022. **(AD):** Two ovum clusters, one contained five ova laid in a double layer (Fig. 3A), and the other contained four ova in a single layer, both attached on the leaf undersides; *Styrax* spp. (Styracaceae); Wuyue Ancient Path, Lin'an District, Hangzhou, 819 m; 23 August 2023. **(AD):** Twenty-five $L_{3–5}$ larvae; *Tetradium glabrifolium* (Rutaceae), *T. sebifera* and *T. ruticarpum*; Tianmushan National Nature Reserve and Liren Village of Damingshan, Lin'an District, Hangzhou, 323–350 m; 18–24 August 2022. **TAIWAN: (OD):** About 2–5 L_4 larvae; *Ilex asprella* (Aquifoliaceae); Erziping, Yangmingshan National Park, Xinbei, ca. 850 m; May 2020. **(OD):** Mature larvae, unknown number; *Lagerstroemia subcostata* (Lythraceae); Dongshi Forest Farm, Dongshi District, Taizhong, ca. 450 m; May 2021. **(OD):** L_4 larvae, unknown number; *Machilus zuihoensis* (Lauraceae); Jiantai Forest Road, Ren'ai Township, Nantou County, ca. 1100 m; September 2023. **(OD):** L_3 and L_5 larvae, unknown number; *Melicope semecarpifolia* (Rutaceae), *T. glabrifolium*; Shoukatiema Station, Hengchun Town, Pingdong County, ca. 450 m and Dahanshan Forest Road, Chunri Township, Pingdong County, ca. 400 m; May 2022, October 2023. **FUJIAN: (OD):** A mature larva; *T. sebifera*; Tianzhushan, Xiamen, ca. 250 m; early June, 2014. **HUNAN: (OD):** Three mature larvae; *C. officinarum*; Yuelushan, Changsha, ca. 129 m; May 2021. **JIANGXI: (OI):** One L_4 larva; *Paulownia* sp.; Wufengshan, Pingxiang, ca. 200 m; mid-November 2022. **CHONGQING: (OD):** Six ova side by side and single layer, attached on the underside of a leaf; *Litsea* sp.; Jiaoniwan, Chengjiang Town, Beibei District, 472 m; 14 April 2024. **SICHUAN: (OD):** Mature larvae, unknown number; *Zanthoxylum ailanthoides*, *Z. armatum*, *Z. bungeanum*; Dafengding, Mabian County, Leshan, ca. 1500 m, and San'e Village, Shawan District, Leshan, ca. 850 m; June–August and October, 2022–2023. **(OD):** Mature larvae, unknown number; *A. altissima*; Baoguo Temple, Mount Emei, Leshan, 521 m; 01 May 2019. **(OD):** Mature larvae,

unknown number; *C. officinarum*; Lüxin Park, Shizhong District, Leshan, ca. 300 m; November 2021. **GUANGDONG: (OD):** About three solitary L_4 larvae; *Litsea* sp.; Xiaxi Village, Conghua District, Guangzhou, ca. 400 m; 05 October and 2022. **(OD):** Three solitary mature larva; *Zanthoxylum* sp.; Nanling National Nature Reserve, Shaoguan, ca. 1300 m; 23 June 2021. **HAINAN: (OD):** Five L_4 larvae; *Zanthoxylum avicennae*; Xiuying District, Haikou, 105.2 m; 13 November 2022. **(OD):** Four cocoons; *Z. avicennae*; Nada Town, Danzhou, 144 m; 12 April 2024.

Notes. *S. wangi* is sister to *S. cynthia* (e.g., Huang et al. 2022) and a completely forest-dwelling species flying in southern China, with a more mountainous distribution and there are populations on both mainland and islands (e.g., Peigler and Liu 2021). Although sometimes difficult to distinguish through wing pattern only, imaginal stage of *S. wangi* tends to be more brownish than *S. cynthia*, and the former usually has narrower crescentic windows on both fore- and hindwings than the latter (Peigler and Naumann 2003: 102). Based on current observations, this species oviposits on the underside of leaves, with eggs arranged in single or double layers and typically fewer than ten eggs per cluster, this number is consistent with the oviposition behaviour reported by Saito (1993) for the closely related Japanese species, *Samia pryeri* (Butler, 1878). The polyphagous *S. wangi* has a total of five larval instars, gregarious when young, but mature individuals are solitary. Unfortunately, there is currently no larval diagnosis that can be used to differentiate between *S. wangi* and *S. cynthia*. In nature, this silkmoth typically exhibits two or more generations annually, and if overwintering (mostly in subtropical zones) it is always as pupal stage. Some life history studies have clarified its voltinism: there are 2–3 generations in Anhui (e.g., Liu et al. 2000; Wan 2011), 3 generations in central (e.g., Chen et al. 2001) (possibly *S. cynthia*?) or southern Henan (e.g., Ding and Jiang 1991; Su 1994), 2 generations in southern Shaanxi (e.g., Zhang 1996; Wang and Pan 2001), 2 generations in Hubei (e.g., Su 2014), 2 generations in Shanghai (e.g., Sun et al. 2003), 2–3 generations in Zhejiang (e.g., Lian and Fang 1980; Pan 1986; Yu et al. 1987), 2–3 generations in Jiangxi (e.g., Wang 1957; Wu et al. 1992; Wang and Yi 2016), 3 generations in Hunan (e.g., Lei and Lin 2012), 2 generations in Fujian (e.g., Li et al. 1991), and 3 generations in Taiwan (e.g., Wang 1994: 81). Although in our artificial environment there were a few individuals that constructed their cocoons away from their foodplants, the feral peduncled cocoons have been widely collected on mostly camphor trees [*Camphora* spp.]. Outwith our records, *S. wangi* has been considered a natural pest of many other cultivated trees in southern China, including the genera *Ziziphus*, *Platanus* (Platanaceae), *Rhus* (Anacardiaceae), *Liriodendron* (Magnoliaceae), *Michelia* (Magnoliaceae), *Citrus* (Rutaceae), *Sloanea* (Elaeocarpaceae), *Elaeocarpus* (Elaeocarpaceae), *Liquidambar* (Altingiaceae), *Pterocarya* (Juglandaceae) and *Camptotheca* (Nyssaceae) (e.g., Lian and Fang 1980; Ding and Jiang 1991; Li et al. 2011; Lei and Lin 2012; Fan et al. 2016). Working in Lianjiang County, Zhanjiang, Guangdong, Chen (1934) recorded the native farmers collecting these brown cocoons from Chinese tallow [*Triadica sebifera*] for spun silk. In recent years, pupae of *S. wangi* and *S. cynthia* have been sold online in China as food for pet birds, sourced from wild cocoons collected in Zhejiang and Shandong, respectively.

3. *Samia kohlli* Naumann & Peigler, 2001

Fig. 1E, F

Material examined. YUNNAN: (AD): A cluster of seven ovum shells, pyramidal (three-layer, 4-2-1), attached on the leaf underside (Fig. 3B), and a cluster of four L_1 larvae (Fig. 3F), one solitary L_3 (Fig. 3H) and two solitary mature larvae (Fig. 3L); *Z. armatum*, *Coriaria nepalensis* (Coriariaceae); Xishan Hills Park, Xishan District, Kunming, 2105 m; 06 and 24 September

2021. **(AD):** One empty cocoon; an unknown plant closed to *C. officinarum*; Xishan Hills Park, Xishan District, Kunming, 2102 m; 01 May 2021. **(AD):** Four L_3 larvae; *C. nepalensis*; Fengyuan Road, Panlong District, Kunming, 1964 m; 18 August 2023. **(AD):** One cocoon; *C. officinarum*; Songhuaba, Panlong District, 2262 m; 22 February 2025. **(AD):** A cluster of eleven L_1 larvae; *Camphora septentrionalis*; Songhuaba, Panlong District, 2239 m; 08 September 2025. **(AD):** Twelve L_5 larvae; *Litsea rubescens*; Songhuaba, Panlong District, 2187 m; 07 October 2025. **(OD):** Three L_4 larvae; *H. acerba*; Kunming Botanical Garden, Panlong District, Kunming, ca. 1990 m; 09 September 2020. **(OD):** A mature larva; *Lagerstroemia tomentosa* (Lythraceae); Kunming Botanical Garden, Panlong District, Kunming, ca. 1990 m; 04 October 2020. **(OD):** A mature larva; found on the ground, its hostplant unknown; Gongdangshenshan, Bingzhongluo Town, Gongshan County, Nujiang, ca. 2000 m; 09 July 2023. **(OD):** Two L_4 larvae and six mature larvae; *Z. armatum*, *Toddalia asiatica* (Rutaceae); Xishuangbanna Tropical Botanical Garden, Menglun Town, Mengla County, Xishuangbanna, ca. 600 m; 03 November 2016 and 27 November 2017.

Notes. In China, this polyphagous species is distributed only in the southwestern provinces such as southeastern Tibet and most of Yunnan, also recorded from the western border of Guangxi (Peigler and Naumann 2003: 136). In a previous Chinese publication, Wu provided preimaginal images only (Wu 2017: 130). Generally, the adults of *S. kohlli* are the largest compared to the other species in the genus, and usually have a brighter colour tone than the other southern China flyer —— *S. wangi*; but some individuals show a darker taupe colour. Oviposition usually occurs on the underside of leaves and there are less than ten eggs per group. Although it is sometimes difficult to directly identify this species without dissecting adult moths or molecular sequencing, each of the dorsal scoli on the 9th abdominal segment [A_9] in the final larval instar (L_5) shows a red tip., This feature clearly distinguishes it from related species in China (see also section 6). There are possibly one or two generations per year in the wild of western and central Yunnan, and possibly more in the southern tropics. In subtropical regions of Yunnan, this species overwinters as a pupa (it is unknown whether this occurs in tropical areas). The pupa is protected within a brownish, peduncled cocoon that is typically attached to the food plant, although some individuals may leave the host after feeding. Furthermore, there are no records of this species being bred or collected for the silk industry.

4. *Samia ricini* (Jones, 1791)

Fig. 2A, B

Material examined. No observation in the wild.

Notes. The famous eri silkworm/silkmoth, an artificial hybrid with no populations in nature. In China, the main captive hosts are *Ricinus communis* (Euphorbiaceae), *Manihot esculenta* (Euphorbiaceae) and *C. nepalensis* (e.g., Wei et al. 1998). Adults usually have greyish wings with denser white hairs covering the abdomen. The larval stage has five-instars and, depending on the varieties, the mature caterpillar has a background colour from white (Fig. 3N), to pale yellow, to blue, sometimes adorned with black patches. In southern China, the generation length is about two months, normally without diapause but overwintering in pupal form under laboratory condition (e.g., Cheng 1959). Cocoons of *S. ricini* are white or rufous ("red eri"), and always attached on hostplants without peduncle. Japanese sericulturists introduced this species to Taiwan Island from India for trial breeding (Koidsumi et al. 1941: 3) in 1919, and began to promote such industry in northeastern China ("Manchuria"), as well as in Shanghai, Beijing, Nanjing and Wuhan since 1940 (Matsumura 1943: 38–57,

Figure 2. Adults of *Samia* spp. of China, dorsal views. **A.** *S. ricini* ♂, Longzhou County, Chongzuo, Guangxi, ca. 130 m, July 2023; **B.** *S. ricini* ♀, Longzhou County, Chongzuo, Guangxi, ca. 130 m, July 2023; **C.** *S. canningi* ♂, Menglun Town, Mengla County, Xishuangbanna, Yunnan, ca. 650 m, May to November 2022; **D.** *S. canningi* ♀, Menglun Town, Mengla County, Xishuangbanna, Yunnan, ca. 650 m, May to November 2022; **E.** *S. watsoni* ♂, Nibashan, Yingjing County, Ya'an, Sichuan, ca. 3200 m, 08 June 2023; **F.** *S. watsoni* ♀, Nibashan, Yingjing County, Ya'an, Sichuan, ca. 3200 m, 08 June 2023. Scale bar: 3 cm.

64–70), but these ventures were all ultimately unsuccessful (Lu 1947). Between 1945 and 1949, some sericultural farms in Jiangsu introduced this species from Taiwan for breeding (Wang 1995: 504), and after the founding of the People's Republic of China, *S. ricini* was reintroduced to mainland from India by the Chinese Academy of Sciences in 1951 and commercial breeding commenced in1954 (Zhu 1959). This species is still farmed principally in southern provinces such as Guangdong and Guangxi.

5. *Samia canningi* (Hutton, 1859)

Fig. 2C, D

Material examined. YUNNAN: (OD): About 10 mature larvae; *Zanthoxylum* sp.; south Ninger County of Pu'er, ca. 1400 m; 27 June 2007. **(OI):** About fourteen mature larvae; unidentified species of Euphorbiaceae; Xishuangbanna; 06 November 2023. **(OD):** A mature larva (Fig. 3M); *Zanthoxylum* sp.; Wild Elephant Valley, Xishuangbanna, ca. 800 m, 18 December 2023.

Notes. Known as the wild eri silkworm/silkmoth, and recently confirmed as the wild progenitor of *S. ricini* through morphological (Peigler and Naumann 2003: 123), breeding (e.g., Brahma et al. 2015), and genomic (e.g., Huang et al. 2022) evidences. Both taxa are polyphagous. Even though biologically these are the same species and the name *S. canningi* is junior to *S. ricini* (Peigler & Calhoun, 2013), Peigler and Luikham (2013) proposed that the name *canningi* should be preserved and added to the Official List of Specific Names in Zoology, for continuing to be used when referring to the wild eri form; this request was finally approved by the International Commission on Zoological Nomenclature (ICZN 2016). *S. canningi* is mostly a Himalayan flyer but its Chinese core population appears on the southwest border including both southwestern Yunnan and southeastern Tibet (Peigler and Naumann 2003: 119), and Wu (2017: 134) has figured feral mature larvae from China. Adults of *S. canningi* have a richer golden hue compared to other *Samia* spp. and are visually high-saturated in colours. There are five larval instars under normal state and the mature larvae are green or yellow-greenish grounded, with relatively larger black patches than *S. cynthia*, *S. wangi* and *S. kohlli*. The precise voltinism in Chinese habitats remains undocumented; however, the occurrence of mature larvae observed in Yunnan during both summer and winter, supplemented by specimens from Xishuangbanna, Yunnan and Mêdog, Tibet reared by us in 2025, suggests the likelihood of at least two generations per year. Like most *Samia*, this species usually spins peduncled bright to grayish brown cocoons on hostplants. There are currently no reports on the use of this species for sericulture in China.

6. *Samia watsoni* (Oberthür, 1914)

Figs 2E, F, 4

Material examined. ZHEJIANG: (AD): Three ovum clusters and all laid in single layer, five unhatched, four unhatched and four hatched (Fig. 3D), all attached on the leaf upperside; *Stewartia gemmata* (Theaceae); Dashuwang, West Tianmushan, Lin'an District, Hangzhou, 902 m, 954 m and 963 m; 14 and 20 August 2023. **(AD):** Four ovum shells, side by side and single layer, attached on the leaf upperside (Fig. 3C), and more than thirty solitary L_{1-4} larvae on the leaf undersides (Fig. 3G, I); *Pterostyrax corymbosus* (Styracaceae); Dashuwang, West Tianmushan, Lin'an District, Hangzhou, 878 m; 13 August 2023. **(AD):** More than fifteen solitary L_{3-5} larvae on the leaf undersides; *P. corymbosus*; Gaoqiaowu, West Tianmushan, Lin'an District, Hangzhou, 857 m; 16 August 2023. **(AI):** One ovum, attached on the leaf upperside; *P. corymbosus*; Qingliangfeng National Nature Reserve, Lin'an District, Hangzhou, 623 m; 28 June 2021. **(OD):** Thirteen solitary mature larvae; *P. corymbosus*; Tianmushan National Nature Reserve, Lin'an District, Hangzhou, ca. 900 m; 09 October 2022.

Notes. *S. watsoni* is regarded as the sister group to all other *Samia* (Peigler and Naumann 2003: 71; Peigler and Liu 2022; Lu et al. 2022). Its habitats cover montane broadleaf forests in subtropical China, with the type locality in Mount Emei of Sichuan, while the population in Taiwan

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has been subjectively considered as a sub- (Kishida 1982) or full species (Naumann et al. 2014). Peigler & Naumann (2003: 170) diagnosed *S. watsoni* as: "Readily separated from other species in the genus by the large size, burgundy or reddish-brown ground color, crescents containing a lot of the transparent component, orange patch on the forewing apex, and a second black eyespot on the outer tip of the forewing." All new observations suggest that females tend to lay eggs on the upper sides of leaves, as previously reported by Peigler and Liu (2022), in which the complete life history of *S. watsoni* was also described for the first time. In the same work, trials suggested that this species is possibly oligophagous on the family Styracaceae (based on the population from Zhejiang), but the authors assumed it utilizes other plants across its wider habitat; here we supplement a new host record from Theaceae. Since 2024, Zhengyang Liu has conducted multiple attempts in Kunming, Yunnan to rear *S. watsoni* originating from Guangxi using *Styrax grandiflorus*, *P. corymbosus*, and *Sinojackia xylocarpa* (Styracaceae), yet all larvae failed to develop beyond L_2. In late April of 2025, many L_1 larvae from a wild-caught female from Fangchenggang, Guangxi, also died after feeding on *P. corymbosus*. However, the 15 dying individuals readily accepted *Symplocos paniculata* (Symplocaceae) and progressed rapidly to the next instar. From this cohort, nine cocoons were obtained (other larvae succumbed to disease between $L_{3–4}$, unrelated to host plant suitability), and three male moths eventually emerged in early July (the remaining pupae desiccated due to arid rearing conditions). Notably, all of them exhibited melanic phenotypes (Fig. 4A–E). In the absence of additional material for further study, we preliminarily hypothesize that this form may be diet-induced, given that their mother displayed the typical reddish-brown form. Nevertheless, further experimentations are needed. Additionally, we learned that all caterpillars of the Taiwanese population consistently failed to pass the first moult after feeding on various native Styracaceae genera (Jinxiu Liang, personal communication to Zhengyang Liu, 28 May and 14 June 2022). Although the red dorsal scoli during mature instar [L_5] of *S. watsoni* is reminiscent of *S. kohlli* (Fig. 3O) (see also section 3), the former usually has thinner white waxy powder on epicuticle, and a plumper body with reduced subdorsal and lateral [L] scoli. In captivity, there were quite a few individuals observed leaving the host plant to spin dark brown cocoons, either peduncled strongly on trees or weakly between fallen leaves (Fig. 3Q). We are not sure how many generations per year this species attains in the wild but based on captive and field observations there might be two or more seasonal flights, as suggested by Lemaire and Peigler (1982).

Figure 3. Preimaginal materials of *Samia* spp. of China. A–I, K–M, **P.** Individuals photographed in the wild. N, O, **Q.** Captive individuals. **A.** Ova of *S. wangi* on leaf underside of *Styrax* sp., Hangzhou; **B.** Ovum shells of *S. kohlli* on leaf underside of *Z. armatum*, Kunming; **C.** Ovum shells of *S. watsoni* on leaf upperside of *P. corymbosus*, Hangzhou; **D.** Ovum shells of *S. watsoni* on leaf upperside of *S. gemmata*, Hangzhou; **E.** Larval cluster of *S. wangi* L_3, dorsal view, on leaf underside of *H. acerba*, Hangzhou; **F.** Larval cluster of *S. kohlli* L_2 (pre-ecdysis), dorsal view, on leaf underside of *Z. armatum*, Kunming; **G.** *S. watsoni* L_2, dorsal view, on leaf underside of *P. corymbosus*, Hangzhou; **H.** *S. kohlli* L_3, dorsal view, on the leaf underside of *C. nepalensis*, Kunming; **I.** *S. watsoni* L_4, dorsolateral view, on leaf underside of *P. corymbosus*, Hangzhou; **J.** *S. cynthia* L_5 (mature), dorsolateral view, on *C. officinarum*; **K.** *S. wangi* L_5 (mature), lateral view, on *S. japonica*, Hangzhou; **L.** *S. kohlli* L_5 (mature), lateral view, on *C. nepalensis*, Kunming; **M.** *S. canningi* L_5 (mature), lateral view, on *Zanthoxylum* sp., Xishuangbanna; **N.** *S. ricini* L_5 (mature), lateral view, on *C. nepalensis*; **O.** *S. watsoni* L_5 (mature), lateral view, on *P. corymbosus*; **P.** Cocoon of *S. wangi*, on *C. officinarum*, Shanghai; **Q.** Cocoon of *S. watsoni*, on *P. corymbosus*.

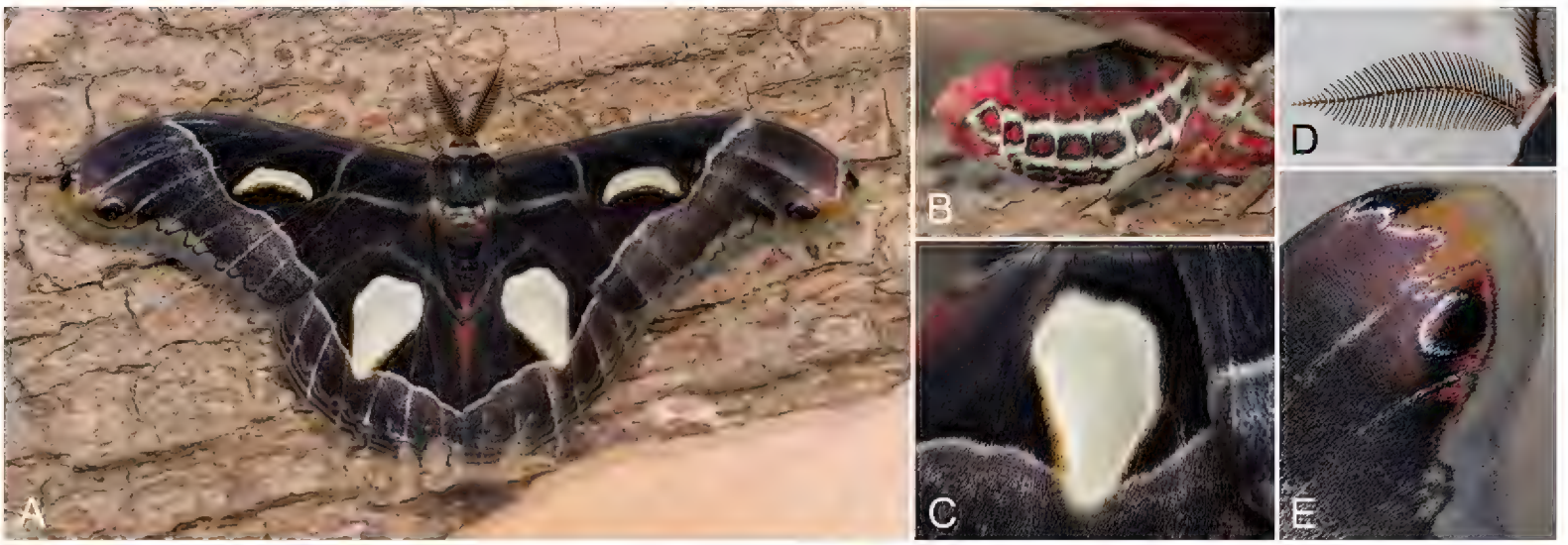

Figure 4. Melanic (aberrant) males of *Samia watsoni* from Fangchenggang, Guangxi, reared in Kunming, Yunnan in April–July 2025, using the host plant *Symplocos paniculata* (Symplocaceae). A and B represent the same individual; C–E represent another individual. **A.** Entire moth, dorsal view; **B.** Thorax and abdomen, lateral view; **C.** Hindwing crescentic window, dorsal view; **D.** Antenna, dorsal view; **E.** Forewing apex, dorsal view.

Discussion

Despite different host choices across habitats, the core group of *S. cynthia*, *S. wangi*, *S. kohlli*, *S. ricini* and *S. canningi* are clearly more receptive to hostplants from Rutaceae, Simaroubaceae, Euphorbiaceae, Lauraceae and Coriariaceae (Fig. 5A–G) —— each of these botanical families is shared in the diets of at least two of the *Samia* spp. mentioned above. In captivity, the polyphagy of these silkmoths extend to plants of other families (e.g., Robinson et al. 2001: 356–358; Meister 2011: 171–172). Our observations indicate that *S. wangi* is also a potential styracaceous feeder naturally, and its Japanese relative *S. pryeri* has locally been recorded to feed on *Styrax japonicus* (Styracaceae) (Fukai 1911), which might suggest that the snowbell family is an ancestral choice for *Samia* because *S. watsoni* belongs to a lineage sister to all other *Samia* species, and there are records of the Nearctic *Callosamia* feeding on Styracaceae (e.g., Tietz 1952: 31) (John Abbot was the first to discover this New World host in the late 1700s (Calhoun 2019), although it was first published by Westwood (1837: 22)), Symplocaceae and Theaceae (Peigler 1988). In contrast, *S. watsoni* shows a strong oligophagous preference, although its currently known hosts are in Styracaceae and Theaceae in the wild (Fig. 5H, I), and Symplocaceae in captivity. In the future, it is very likely that the latter two families will be used to successfully feed material from Taiwan. It is important to note here that although the three known hostplants of *Samia watsoni* are in different plant families, they are phylogenetically closely related. In a comprehensive study of the phylogeny within the order Ericales, Rose et al. (2018) showed in a cladogram that Styracaceae and Symplocaceae are sister taxa, with Theaceae as the sister to those two and a few other families.

Within the same tribe, a mature larva of *Archaeoattacus edwardsii* (White, 1859) was found in nature on *Macaranga pustulata* (Euphorbiaceae) in Yingjiang County of Yunnan in early autumn of 2023, and Zhengyang Liu has recently received and identified the plant samples. This suggests that Euphorbiaceae may be an ancestral host for Attacini, a tribe originating from Asia (e.g., Rougerie et al. preprint), because except *Samia* and *Archaeoattacus*, the well-known *Attacus atlas* (Linnaeus, 1758), has long been known as a natural feeder of another Euphorbiaceae *Triadica sebifera* in southern China. The hostplant relations within the tribe Attacini were discussed in

Figure 5. Main nature hostplants of *Samia* spp. of China. **A.** *Ailanthus altissima* (Simaroubaceae); **B.** *Zanthoxylum armatum* (Rutaceae); **C.** *Tetradium ruticarpum* (Rutaceae); **D.** *Camphora officinarum* (Lauraceae); **E.** *Triadica sebifera* (Euphorbiaceae); **F.** *Coriaria nepalensis* (Coriariaceae); **G.** *Ricinus communis* (Euphorbiaceae); **H.** *Pterostyrax corymbosus* (Styracaceae). **I.** *Stewartia gemmata* (Theaceae).

detail by Peigler (1989: 92–93) and Peigler & Naumann (2003: 51–55). It remains unknown which hostplant families are most likely to be the ancestral ones for the tribe, but several families emerge as potential candidates, including Rutaceae, Lauraceae, Euphorbiaceae, and Simaroubaceae due to usage by some or most genera of Attacini.

In 1996 Richard Peigler was sent a living pupa of *A. edwardsii* within its cocoon, which was collected on avocado (*Persea americana*, Lauraceae) in West Malaysia by Ulrich Paukstadt. Although this plant is native to Mexico, we believe that more lauraceous species are likely utilized by *Archaeoattacus* in the wild. Interestingly, our colleague Zhiqi Zhang discovered a L_1 larva of *Rhodinia* cf. *newara*

(Moore, 1872) feeding on *Camphora glandulifera* (Lauraceae) during his fieldwork in Gongshan County, Yunnan, on 25 April 2024. The genus *Rhodinia* has recently been confirmed to be a member of Attacini (Wolfe 2005; Rubin et al. 2018; Chen et al. 2021) and to be the sister group of all other genera within the tribe (Rougerie et al. preprint), while in Zhengyang Liu's previous field surveys in Liaoning, Qinghai, Tibet, Henan and Yunnan, there were cocoons and larvae of *Rhodinia* spp. collected on Betulaceae, Rosaceae, Juglandaceae, Fagaceae, Salicaceae, Rutaceae and Nyssaceae. Liu (2024) suggested that Lauraceae was a host for the last common ancestor of the subfamily Saturniinae, a hypothesis supported here by the widespread lauraceous usage in the Attacini lineage.

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